

DESCRIPTION

Sheet Feeder

5 Technical Field

[0001] The present invention relates to a sheet feeder for separating sheets one by one from sheets piled on a sheet feeding table, and for carrying the sheets.

Background Art

10 [0002] For example, Patent Document 1 discloses a sheet processor. In this sheet processor, sheets are carried and fed to a processor body one by one, by a sheet feeder. And in the processor body, the sheet is processed by being cut and/or folded in a carrying direction, or in a direction
15 perpendicular to the carrying direction, while the sheets are being carried. Also, for example, Patent Document 2 discloses a technique that sheets are sucked and carried one by one in a sheet feeder. Further, for example, Patent Document 3 discloses a technique that a handling member is
20 positioned in a handling location when a sheet feeding cassette is in a sheet feeding position, and that the handling member is retracted from the handling location when the sheet feeding cassette is not in the sheet feeding position.

25 [0003] Patent Document 1: Japanese Laid-Open Patent

Publication No. 2001-232700

Patent Document 2: Japanese Laid-Open Patent
Publication No. 2000-34052

Patent Document 3: Japanese Laid-Open Patent
5 Publication No. H11-334901

Disclosure of Invention

Problem to Be Solved by the Invention

[0004] In the sheet processor of the Patent Document 1,
for example, the process for cutting a sheet in the
10 carrying direction, is made with reference to an edge of
the sheet. Therefore, in each of the sheet feeders of
Patent Documents 1 and 2, the sheet is fed with an edge
thereof being positioned along a guide wall.

[0005] Fig. 3 is a plan view showing such a sheet feeder
15 as aforementioned. This sheet feeder has a construction in
which the sheet is fed with the edge thereof being
positioned along the guide wall. The sheet feeder is
composed of a suction carrying means 2 locating in the
upstream side in the carrying direction (i.e. a direction
20 of an arrow "A") and an oblique carrying means 3 locating
in the downstream side in the same direction, in which the
suction carrying means 2 and the oblique carrying means 3
are integrated to each other. Fig. 4 is a vertical
sectional diagrammatical view showing a conventional sheet
25 feeder, and this figure corresponds to a sectional view

taken on a line IV-IV in Fig. 3. The suction carrying means 2 sucks up an uppermost sheet 10 locating on top of the sheets 10 which are piled on a sheet feeding table 11, and then the means 2 carries the sheet 10 from the upstream side to the downstream side in the carrying direction. The oblique carrying means 3 carries the sheet 10 on the oblique carrying means 3. The oblique carrying means 3 carries the sheet 10 slantingly toward the guide wall 31, in order to position the edge of the sheet 10 along the guide wall 31. Further, the oblique carrying means 3 carries the sheet 10 downstream in the carrying direction. There is provided a handling member 4 below of the downstream side of the suction carrying means 2. The handling member 4 allows only the uppermost sheet 10 carried by the suction carrying means 2 to pass through it.

[0006] In the above conventional sheet feeder, when the sheet 10 passes through the handling member 4 and starts to be carried on the oblique carrying means 3, the sheet 10 still contacts the handling member 4, as shown in Fig. 4. The condition thereof continues until a rear end 102 of the sheet 10 passes through the handling member 4. In case that the sheet 10 is kept to contact the handling member 4, the handling member 4 becomes a hindrance to the sheet 10, and therefore the sheet 10 on the oblique carrying means 3 can not be carried smoothly. As a result, there arises a

problem that the sheet 10 is fed from the sheet feeder before the edge of the sheet 10 gets to be positioned along the guide wall 31.

[0007] Also, in the sheet feeder of Patent Document 3, the handling member is all the time positioned in the handling location when the sheet is fed. Therefore, there arises a problem similar to that as aforementioned.

[0008] The object of the present invention is to provide a sheet feeder, in which when the sheet which is passing through the handling member 4, is carried slantingly toward the guide wall 31 by the oblique carrying means 3, the handling member 4 is prevented from becoming a hindrance to the carrying, and therefore a smooth carrying by the oblique carrying means 3 is realized.

Means for Solving the Problem

[0009] The present invention has a characterization that there are provided a detecting means and a retracting mechanism, in a sheet feeder that has a suction carrying means, an oblique carrying means and a handling member, and that separates sheets one by one from top of sheets piled up on a sheet feeding table and then carries the sheets. The suction carrying means sucks an uppermost sheet of sheets piled up and carries the uppermost sheet from the upstream side to the downstream side in a carrying direction. The oblique carrying means is a means for

carrying the sheet on the oblique carrying means, in which
the oblique carrying means locates in the downstream side
of the suction carrying means, in which the oblique
carrying means carries the sheet slantingly toward a guide
5 wall in order to position an edge of the sheet along the
guide wall, and in which the oblique carrying means carries
the sheet downstream in the carrying direction. The
handling member allows only the uppermost sheet carried by
the suction carrying means to pass through the handling
10 member. The detecting means detects the sheet which is
passing through the handling member, in which the detecting
means locates downstream of the handling member. And the
retracting mechanism retracts the handling member from the
sheet passing through the handling member while the
15 detecting means is detecting the sheet passing through.

Effect of the Invention

[0010] In the present invention, while the detecting
means is detecting the sheet which is passing through the
handling member, the retracting mechanism retracts the
20 handling member from the sheet passing through. Therefore,
according to the present invention, when the sheet passing
through is carried slantingly toward the guide wall by the
oblique carrying means, it is prevented that the handling
member becomes a hindrance to the carrying and therefore a
25 smooth carrying by the oblique carrying means is realized.

That is, according to the present invention, the sheet can be carried smoothly by the oblique carrying means, without interference by the handling member. Accordingly, the present invention can solve the problem that the sheet with one edge thereof being not positioned along the guide wall is fed from the sheet feeder. Consequently, the present invention can assure that the sheet after feeding is processed accurately by the processor body.

Brief Description of Drawings

[0011] Fig. 1: It is a vertical sectional diagrammatical view showing a sheet feeder according to the present invention, and it corresponds to a sectional view taken on a line I-I in Fig. 3.

Fig. 2: It is a vertical sectional diagrammatical view showing a condition of operation which follows that shown in Fig. 1.

Fig. 3: It is a plan view showing the sheet feeder.

Fig. 4: It is a vertical sectional diagrammatical view showing a conventional sheet feeder, and it corresponds to a sectional view taken on a line IV-IV in Fig. 3.

Description of Reference Numerals

[0012] 2 Suction carrying means

3 Oblique carrying means

31 Guide wall

- 6 Handling member
- 7 Detecting means
- 8 Retracting mechanism

Best Mode for Carrying Out the Invention

5 [0013] Fig. 1 is a vertical sectional diagrammatical view showing a sheet feeder according to the present invention, and it corresponds to a sectional view taken on a line I-I in Fig. 3. In Figs. 1 and 4, the same reference numerals indicate the same or corresponding components.

10 The sheet feeder according to the present invention has a suction carrying means 2 locating in the upstream side in a carrying direction (i.e. a direction of an arrow "A") and an oblique carrying means 3 locating in the downstream side in the same direction, in which the suction carrying means

15 2 and the oblique carrying means 3 are integrated to each other.

[0014] More specifically, the sheet feeder of the present invention has the suction carrying means 2, an air blowing means (not shown), a handling member 6, and the

20 oblique carrying means 3. The suction carrying means 2 sucks up an uppermost sheet 10 locating on top of sheets 10 which are piled on a sheet feeding table 11, and then the means 2 carries the sheet 10 from the upstream side to the downstream side in the carrying direction. The air blowing

25 means blows air toward front edges 101 of the downstream

side of the sheets 10 piled up, from its downstream side. The handling member 6 allows only the uppermost sheet 10 which is carried by the suction carrying means 2 to pass through it. The oblique carrying means 3 carries the sheet 10 on the oblique carrying means 3. The oblique carrying means 3 carries the sheet 10 slantingly toward the guide wall 31, in order to position an edge of the sheet 10 along the guide wall 31, and the oblique carrying means 3 carries the sheet 10 downstream in the carrying direction. Incidentally, the sheets 10 are piled up on the sheet feeding table 11. Also, the front edges 101 of the sheets 10 contact an end wall 12 of the downstream side of the sheet feeding table 11.

[0015] The suction carrying means 2 has an endless annular belt 22 and a suction means (not shown). The belt 22 extends between a pair of rotation rollers 21. The suction means sucks up the sheet 10 below the belt 22 and makes the sheet 10 be sucked to the belt 22. The suction carrying means 2 carries the sheet 10 downstream in accordance with the movement of the belt 22 in the direction of an arrow, in a state that the sheet 10 is sucked to the belt 22.

[0016] The air blowing means has a blowing part (not shown) which penetrates the end wall 12, and an air blower (not shown) which is connected to the blowing part. The

air blowing means blows air through the blowing part from the downstream side to the upstream side.

[0017] The oblique carrying means 3 carries the sheet 10 having been carried by the suction carrying means 2, on an
5 endless annular belt 33. The belt 33 extends between a pair of rotation rollers 32. The belt 33 is provided slightly slantingly toward the guide wall 31 with respect to the carrying direction. Therefore, in the oblique carrying means 3, the sheet 10 is carried with being pushed
10 to the guide wall 31 side. Consequently, the sheet 10 is carried in the direction of the arrow "A" in a state that an edge of the sheet 10 is positioned along the guide wall 31.

[0018] The handling member 6 of the present invention is
15 provided with a detecting means 7 and a retracting mechanism 8.

[0019] The handling member 6 has a projection piece 61. The projection piece 61 is arranged above the end wall 12 of the sheet feeding table 11 and below the suction
20 carrying means 2, and the projection piece 61 is arranged in a standing state and tilts toward the carrying direction.

[0020] The detecting means 7 has a sensor 71 which is arranged above an end part of the upstream side of the oblique carrying means 3. When the sensor 71 detects the
25 front edge 101 of the sheet 10 which has been carried on

the belt 33 of the oblique carrying means 3, it outputs a retract signal to the retracting mechanism 8. And when the sensor 71 detects the rear edge 102 of the sheet 10, it outputs a return signal to the retracting mechanism 8.

5 [0021] The retracting mechanism 8 has a piston mechanism 81, a first arm 82 which is linked to the piston mechanism 81, and a second arm 83 which is rotatably connected to the first arm 82. In the retracting mechanism 8, the projection piece 61 is supported on a tip part of the
10 second arm 83. As shown in Fig. 2, when the retracting mechanism 8 receives the retract signal from the sensor 71, the piston mechanism 81 is operated so as to pull down the first arm 82. Thereby, the retracting mechanism 8 makes the posture of the first arm 82 generally upright and
15 therewith rotates the second arm 83 to make the posture of the second arm 83 generally upright. As a result, an edge 611 of the projection piece 61 is lowered in position. Meanwhile, when the retracting mechanism 8 receives the return signal from the sensor 71, the piston mechanism 81
20 is operated so as to push up the first arm 82. Thereby, the retracting mechanism 8 returns the projection piece 61 back to a condition shown in Fig. 1, which is, namely, a condition for handling the sheet.

25 [0022] Next, it is explained about an operation of the sheet feeder having the above construction.

Firstly, the air blowing means is operated so that air is blown from the blowing part toward an upper part of the sheets 10 piled up on the sheet feeding table 11. Thereby, a gap is formed between adjacent several sheets 10
5 locating on an upper part thereof, and those sheets 10 are floated from each other, thus making it easy to separate the sheets 10 from each other. In this condition, the suction means of the suction carrying means 2 is operated. Thereby, an uppermost sheet 10 of the several sheets 10
10 which are subject to easy separation from each other, is sucked up, and the uppermost sheet 10 is sucked to the belt 22. Then, the rotation roller 21 is operated. With this operation, the sheet 10 having been sucked to the belt 22, passes through the handling member 6 and is then carried to
15 the oblique carrying means 3 in accordance with the movement of the belt 22. The oblique carrying means 3 carries the sheet 10 on the belt 33. The oblique carrying means 3 carries the sheet 10 slantingly toward the guide wall 31, and at the same time the oblique carrying means 3
20 carries the sheet 10 downstream in the carrying direction. Thereby, the sheet 10 is fed in the direction of the arrow "A", in a state that the edge of the sheet 10 is positioned along the guide wall 31.

[0023] During the aforementioned operation, as shown in
25 Fig. 1, when the sheet 10 is sucked and carried by the

suction carrying means 2, when the sheet 10 passes through the handling member 6, and when the front edge 101 is put on the belt 33 of the oblique carrying means 3, the sensor 71 detects the front edge 101, and the retract signal is sent to the retracting mechanism 8. Receiving the retract signal, the retracting mechanism 8 makes the piston mechanism 81 operate and makes the edge 611 of the projection piece 61 be lowered in position, as shown in Fig. 2. With this operation, the handling member 6 is kept in a state of non-contact with the sheet 10 which is passing through the handling member 6. Consequently, the sheet 10 in which the front edge 101 has been put on the belt 33 of the oblique carrying means 3 is carried smoothly by the oblique carrying means 3, with no interference by the handling member 6. Therefore, according to the sheet feeder having the aforementioned construction, the sheet 10 is fed in the direction of the arrow "A" by the oblique carrying means 3, in a state that the edge of the sheet 10 is positioned surely along the guide wall 31.

[0024] When the sensor 71 detects the rear edge 102 of the sheet 10 which has passed through the handling member 6, it outputs the return signal to the retracting mechanism 8. Receiving the return signal, the retracting mechanism 8 makes the piston mechanism 81 operate, as aforementioned, and makes the projection piece 61 be returned to a state

for handling the sheet. With this operation, a new sheet 10 is sucked and carried by the suction carrying means 2, and the new sheet 10 passes through the handling member 6.

[0025] As mentioned above, according to the sheet feeder having the above construction, while the detecting means 7 is detecting the sheet 10 which is passing through the handling member 6, the retracting mechanism 8 makes the handling member 6 retract from the sheet 10 which is passing through the handling member 6. Therefore, the sheet 10 can be carried smoothly by the oblique carrying means 3, without any interference by the handling member 6. Consequently, according to the sheet feeder having the above construction, the sheet 10 is fed by the oblique carrying means 3, in a state that the edge of the sheet 10 is positioned surely along the guide wall 31.

Industrial Applicability

[0026] The sheet feeder of the present invention can feed a sheet, in a state that an edge of the sheet 10 is positioned surely along the guide wall. As a result, exact process of the sheet in a processor body is ensured, and therefore the utility value in industry is large.